



Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (40 CFR 432)

The full document is available at: <http://www.epa.gov/ost/guide/mpp/>

EPA-821-R-04-011



SECTION 11

POLLUTANT LOADINGS

This section presents the methodology used to derive annual pollutant loading estimates for the meat and poultry products (MPP) industry. Pollutant loadings are estimated for the MPP industry to (1) evaluate the effectiveness of treatment technology options, (2) estimate the benefits gained from reducing the amount of pollutants discharged, and (3) evaluate the cost-effectiveness of the technology options in reducing the pollutant loadings. Baseline pollutant loadings and technology option loadings are defined as follows:

- *Baseline pollutant loadings.* The estimated amount of pollutants in MPP wastewaters currently being discharged to surface waters. For the purpose of this analysis, EPA considers the baseline pollutant loadings the amount that was discharged in the base year of the survey (1999).
- *Technology option loadings.* The estimated amount of pollutants in MPP wastewaters discharged to surface waters *after* the implementation of the limitations and guidelines, also referred to as post-compliance or treated pollutant loadings. In calculating these loadings, EPA assumed that all MPP facilities currently discharging pollutants at higher concentrations than the long-term average (LTA) concentrations of the selected technology option level would upgrade as necessary and operate their wastewater treatment systems to meet the target LTA concentration levels.
- *Pollutant removals.* The estimated amount of pollutants removed from wastewaters after the implementation of the limitations and guidelines. Pollutant removals are calculated by taking the difference between baseline pollutant loadings and technology option loadings.

As described in Section 10, in response to comments EPA substantially revised the method to estimate compliance costs by applying a facility-specific approach and using survey weights to develop national estimates. To remain consistent with the revised costing methodology, the assessment of pollutant loading reductions was developed on a facility level similar to the revised analysis of costs. In addition, as was done for compliance cost estimates,

facilities were grouped by regulatory subcategories (i.e., subcategories A through D, F through I, K, and L) in the development of national loading estimates.

For the proposed rule, EPA estimated pollutant loadings for all the pollutants of concern identified at proposal for the meat and poultry subcategories. These pollutants are listed in Section 7, Tables 7-2 and 7-3 (at proposal, carbaryl and *Salmonella* were also pollutants of concern for the meat subcategories and poultry subcategories, respectively). As described in Section 14, LTAs were developed for 11 pollutants of concern. These 11 pollutants of concern are comprised of the eight pollutants that were proposed for regulation (ammonia (as nitrogen), 5-day biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), fecal coliforms, oil and grease (as hexane extractable material [HEM]), total nitrogen, total phosphorus, and total suspended solids (TSS)), with the addition of three other pollutants (5-day carbonaceous biological oxygen demand (CBOD₅), nitrate+nitrite as nitrogen, and total kjeldahl nitrogen (TKN)) that were also considered for regulation after the proposal. For the final rule, since pollutant removals can only be estimated for pollutants with a target LTA, EPA only estimated pollutant loadings for the 11 pollutants for which LTAs were established.

11.1 BASELINE POLLUTANT LOADINGS

11.1.1 Establishment of Facility Specific Baseline Pollutant Concentrations

To estimate the baseline pollutant *loadings*, baseline pollutant *concentrations* for the selected 11 pollutants of concern (POC) were first established for each facility in which loadings were estimated. Facility baseline concentrations are the estimated pollutant concentrations in the MPP wastewaters that a facility is currently discharging.

The following sections describes the methodology used to develop facility-specific baseline pollutant concentrations.

11.1.1.1 Pollutant Concentrations from Analytical Data

For each facility, extensive efforts were made to obtain analytical effluent wastewater concentration data representative of the treatment system in place at the facility. When available, and generally in order of preference, the following data sources were used to establish the baseline pollutant concentration for a specific facility:

- Data provided by the facility in their response to the detailed survey.
- Corrections to a “fact sheet” sent to each facility that summarized detailed survey information about the facility’s effluent concentrations, wastewater flows, and wastewater treatment operations.
- Data provided by the facility through telephone communications.
- Data collected by EPA as part of the sampling episode performed for the rulemaking effort.
- Site visit data.
- Discharge monitoring report (DMR) data from the EPA Permit Compliance System (PCS), EPA Regional Office, or State regulatory agency.
- Effluent data provided in the facility’s National Pollutant Discharge Elimination System (NPDES) permit application.

When effluent data were available from any of the sources described above, the annual average concentrations reported for 1999 were used for determining baseline loadings because 1999 was the year of the MPP detailed survey. Concentrations reported for years after 1999 were also used, but only when data from 1999 were unavailable and only if facility operations or treatment performance had not significantly changed since 1999. In instances where data from more than one source were available for a particular facility, the average that represented and encompassed the largest span of time was used. For example, if both detailed survey data and sampling episode data were available for a facility, the detailed survey data were used instead of

the sampling episode data. In this example the detailed survey data represented the average pollutant concentration over a year while the sampling episode data represented the average concentration over a period of 3 or 5 days.

11.1.1.2 Pollutant Concentrations Calculated Based on Associated Pollutant Parameters

When effluent data for a pollutant or pollutants could not be obtained from any of the above data sources, default concentrations were calculated. In particular, EPA calculated default concentrations for certain pollutants if data on an associated pollutant parameter were available. For example, based on the available data from the sampling episodes and detailed survey data, a strong relationship was found between BOD₅ and CBOD₅ concentrations in MPP wastewaters. Therefore, when a facility did not have data on effluent CBOD₅ concentrations, but did have effluent BOD₅ data, then the CBOD₅ concentration could be estimated based on the BOD₅ data (more detailed information on the calculations and formula development are available in Section 19.6.1, DCN 100784 of the rulemaking record).

The following methodologies were used to estimate baseline pollutant concentrations for certain pollutant parameters:

- **BOD₅:** If BOD₅ data were unavailable but CBOD₅ data were available, BOD₅ was calculated as:

$$\text{BOD}_5 = (\text{CBOD} - 0.0302) / 0.8442.$$

This formula was based on the relationship found from all paired effluent BOD₅ and CBOD₅ data available in the detailed surveys and sampling episodes.

- **CBOD₅:** If CBOD data were unavailable but BOD₅ data were available, CBOD₅ was calculated as:

$$\text{CBOD}_5 = (0.8442 \times \text{BOD}_5) + 0.0302.$$

This formula was based on the relationship found from all paired effluent BOD₅ and CBOD₅ data available in the detailed surveys and sampling episodes.

- **TKN:** If TKN data were unavailable but ammonia (as nitrogen) data were available, TKN was calculated as:

$$\text{TKN} = \text{NH}_3 + 1.98.$$

This formula was based on the average organic fraction from all detailed survey and sampling episode data with paired effluent ammonia (as nitrogen) and TKN data.

- **Nitrate+nitrite:** Effluent nitrate+nitrite concentrations were calculated in several ways, depending on the data available for a particular facility.
 - a. If nitrate+nitrite data were unavailable but total nitrogen data were available, nitrate+nitrite was calculated as

$$\text{nitrate+nitrite} = \text{total nitrogen} - \text{TKN}$$

- b. If effluent data for only nitrate were available (i.e., no nitrite, or nitrate+nitrate data), then the nitrate+nitrite concentration was calculated as

$$\text{nitrate+nitrite} = \text{nitrate} + 0.62$$

This formula was based on the average nitrite concentration from all facilities with separate nitrate and nitrite data.

- c. If nitrate+nitrite could not be calculated from the methods above, then nitrate+nitrite values were calculated based on influent and effluent total nitrogen balance equations as follows:

For facilities that do not engage denitrification in their wastewater treatment system (Option 2 variants or less, i.e., Option 1 and 2+P):

$$\text{Effluent nitrate+nitrite} = (\text{BNR influent total nitrogen}) - (\text{effluent TKN})$$

Where:

$$\text{Total nitrogen} = (\text{nitrate+nitrite}) + \text{TKN}$$

Based on the following relationship:

$$\text{BNR influent total nitrogen} - \text{nitrogen removed from sludge wasting} = \text{Effluent total nitrogen}$$

Therefore:

$$(\text{BNR influent TKN}) + (\text{BNR influent nitrate+nitrite}) - (\text{nitrogen removed from sludge wasting}) = (\text{effluent TKN}) + (\text{effluent nitrate+nitrite})$$

"BNR influent" refers to the influent to the biological nutrient removal (BNR) treatment system. The beginning of the BNR system was considered to be where either nitrification or denitrification first occurred in the wastewater treatment system (for example, the activated sludge or anoxic basin).

For BNR influent total nitrogen, if BNR influent nitrate+nitrite data were not available for a facility, then it was assumed to be negligible and set equal to zero. The amount of nitrogen removed from sludge wasting was also assumed to be negligible and not incorporated in the calculations.

For partial denitrification facilities (all variants of Option 2.5, i.e., Option 2.5+F, Option 2.5+P, etc.):

$$\text{Effluent nitrate+nitrite} = [(\text{BNR influent total nitrogen}) \times (\text{TN reduction factor})] - (\text{effluent TKN})$$

Where:

TN reduction factor: This factor was based on the average total nitrogen reduction rate for partial denitrification facilities of the appropriate meat type.

For red meat facilities, the average total nitrogen reduction was 43% (based on data from six facilities). For poultry facilities, the average total nitrogen reduction was 56% (based on data from six facilities). For mixed meat further processors and independent renderers, the total nitrogen reduction was 49.5%, which was calculated

by taking the average of the reductions for red meat and for poultry (i.e., the average of 43% and 56%). The reduction factor was calculated by subtracting the percent reduction from one (i.e., for red meat, the reduction factor = $1 - 0.43 = 0.57$).

- **Total nitrogen:** If total nitrogen data were unavailable, then total nitrogen was calculated as:

$$\text{total nitrogen} = (\text{nitrate} + \text{nitrite}) + \text{TKN}$$

- **Total phosphorus:** If total phosphorus data were unavailable, total phosphorus was calculated as follows:
 - a. The phosphorus concentration entering a treatment system's nitrification or denitrification stage was calculated based on the facility's manufacturing processes and wastewater pre-treatment units. See *Detailed Costing Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category* (DCN 300004) for detailed descriptions on the calculation of BNR influent concentrations.
 - b. Based on this concentration and the wastewater flow, the phosphorus mass (in pounds per day) entering the nitrification or denitrification stage could be calculated.
 - c. The amount of biosludge produced by nitrification systems was calculated using the influent/effluent BOD₅ and TKN concentrations and the respective yield coefficients. The amount of sludge produced from denitrification systems was determined by the calculated amount of nitrates removed in the anoxic reactor and the relevant yield coefficients. Based on data from technical literature, it was assumed that the biosludge contained 2 percent phosphorus¹. From these calculations, the mass of phosphorus removed from biosludge wasting could be determined.

¹ WEF, 1998. *Biological and chemical systems for nutrient removal*. Water Environment Foundation, Alexandria, Virginia.

- d. The final effluent phosphorus concentration was calculated by determining the remaining mass of phosphorus in the wastewater and using the following formula:

$$\text{Final effluent phosphorus (mg/L)} = \frac{(\text{phosphorus in lb/day}) \times 1,000,000}{\text{Flow (gallons/day)} \times 8.34}$$

11.1.1.3 Pollutant Concentrations Based on Default Values

Considerable effort was made to either obtain analytical effluent concentration data or to calculate pollutant concentrations based on another pollutant where a correlation was demonstrated. However, when analytical effluent data for a particular pollutant was unavailable and could not be calculated then a default value was used for the facility. Default concentrations were calculated for BOD₅, COD, fecal coliforms, ammonia (as nitrogen), oil and grease, and TSS. For each regulatory subcategory, all the available analytical data for a particular pollutant was averaged from all the facilities matching the subcategory and with treatment-in-place performance comparable to Option 2 and above, and this average was used as the default value. A summary of the default concentrations used for developing baseline pollutant concentrations are presented in Table 11-2.

Table 11-2. Default Concentrations for Facility Baseline Concentration Development (in mg/L)

Regulatory Subcategory	BOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Oil and Grease	TSS
A-D	11.6	70	114	2.72	6.6	23
K	8.0	46	537	1.44	5.0	12
F-I and L	12.6	77	194	3.12	5.0	17
J	7.5	111	124	5.82	0.3	16

^a NH₃-N=Ammonia (as nitrogen)

As an example, all the available TSS data from Subcategory K facilities with treatment-in-place levels of Option 2 and above were averaged. The resulting average TSS concentration was calculated to be 12 mg/L, and it would subsequently be used as the default concentration for any Subcategory K facility in which effluent data for TSS were unavailable.

A single default set to be used by all facilities of a particular regulatory subcategory was developed only using data from facilities with a treatment-in-place performance of Option 2 and above for the following reasons:

- Previous attempts at developing a unique default set for each treatment-in-place level that was based on all the data from facilities matching that particular treatment-in-place level (i.e., one default set for Option 2+P facilities based on all the data from Option 2+P facilities, another default set for Option 4 facilities based on all data from Option 4 facilities) failed because for many pollutant parameters, no data was available for certain treatment-in-place levels. Additionally, many of the indicated differences in default concentrations between the treatment-in-place levels for which data was available were found to be relatively small for most pollutants.
- Since all facilities with a treatment-in-place of Option 2 and above perform full nitrification, the inclusion of ammonia (as nitrogen) concentrations from facilities that did not perform full nitrification (i.e., those classified as Option 1) would have inappropriately raised the default value for ammonia (as nitrogen).
- Most of the facilities for which loading estimates were developed had treatment-in-place performance comparable to Option 2 and above, therefore the default value should be based on data from facilities with treatment-in-place performance comparable to Option 2 and above.

Because of the general lack of data for the pollutants of concern for stand-alone red meat or poultry further processors (Subcategories F through I and L, respectively), the baseline data from these two facility types were combined. The result was one set of default baseline concentrations that was applied to all further processors, regardless of whether it was a red meat or poultry further processor. The expectation is that the wastewater characteristics at further processors are more likely to be dependent on the processing operation (e.g., breeding, frying) than on the type of meat.

For independent rendering facilities (Subcategory J), in addition to all the available analytical data, data provided by the MPP Industry Coalition for three independent rendering facilities, and data provided by the National Renderers Association for two independent rendering facilities were used in the development of default concentrations for these facilities (see DCN 100078 in Section 19.3.5 of the Docket).

11.1.1.4 Permit Limit Adjustments

After pollutant concentrations for each facility were determined from the previous steps, they were adjusted for applicable NPDES permit limits for the facility to more accurately estimate the effect of the new limitations and standards compared to current regulations. When permit limits were available for a facility (from a copy of the facility's NPDES permit or from PCS), the concentration was lowered to equal the facility's permit limit value if the average effluent concentration was greater than the limit specified in the permit². Monthly average limitations contained in the permit were used when available; maximum daily limitations were used when monthly averages were not available. When seasonal limits were included in a permit, an average concentration for the permit was calculated using all seasonal limits. For example, if the permit BOD limit was 20 mg/L for 6 months and 10 mg/L for 6 months, the average value of 15 mg/L was used for the permit limitation.

The final baseline concentration for each pollutant at each facility was established after adjustments for permit limits.

11.1.2 Facility-Specific Baseline Pollutant Loading Estimates

Baseline pollutant loadings for 1999 for each facility and pollutant parameter were calculated as follows:

$$\text{Load} = (\text{concentration} \times \text{flow} \times \text{conversion factor}) / 1,000,000$$

² Permit limit adjustments could not be made when only mass based limits were specified in the permit. Concentration based permit limits applicable in 1999 were used when available. However, the most current permit requirements were used when the limits for 1999 were unknown for any particular facility.

where:

load = pollutant loadings, in pounds per year (lb/year) or million colony-forming units per year (million cfu/year)

concentration = pollutant concentration, in milligrams per liter (mg/L), or cfu/100 mL

flow = facility average annual effluent flow rate as reported in the MPP detailed survey, in gallons per year

conversion factor = the conversion factor used is dependent on the concentration units of the pollutant:

mg/L = 8.345, and
cfu/100 mL = 37.8.

Facility-specific baseline pollutant loading estimates for non-small slaughtering facilities are presented in Table 11-3. Facility-specific baseline pollutant loading estimates for non-small further processing and independent rendering facilities are available in the Confidential Business Rulemaking Record (DCN 300009). In addition, facility-specific baseline pollutant loading estimates for small facilities are available in the Confidential Business Rulemaking Record (DCN 300010).

Table 11-3. Facility-Specific Baseline Loading Estimates (in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DET ID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	209,904	62,376	10,098	218,586	27,541	19,187	237,773	82,664	59,673
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	665,980	28,025	17,827	683,807	398,031	59,525
0019	P13	NS	11,782	10,031	129,199	12,798	1,384	256,259	14,220	848	257,107	11,866	13,420
0020	P12	NS	31,248	26,550	258,872	625,681	10,869	270,647	26,607	22,078	292,725	87,489	49,364
0022	P123	NS	23,421	19,874	153,774	125,513	1,211	335,293	16,924	7,667	342,960	129,427	52,627
0026	P13	NS	12,594	10,795	246,814	2,273,690	5,397	273,215	21,590	16,084	289,300	229,161	75,563
0027	P12	NS	58,694	49,685	206,143	11,379,208	10,008	363,198	22,688	18,933	382,132	76,543	52,262
0029	P1	NS	48,982	41,425	111,429	154,526	31,799	19,636	12,264	36,624	56,261	19,494	46,298
0032	P1	NS	5,917	5,075	122,154	48,400	2,778	57,753	13,356	8,067	65,820	64,317	16,562
0039	P12	NS	23,011	19,557	198,540	1,868,315	2,605	351,475	14,328	11,202	362,676	37,373	26,050
0042	P12	NS	26,797	22,725	156,697	356,997	1,302	273,031	19,052	8,087	281,118	64,430	28,578
0044	P123	NS	26,300	22,321	178,704	3,540,310	8,285	101,723	2,462	16,022	117,746	131,664	42,596
0045	P12	NS	86,262	72,951	195,279	166,353	4,270	147,797	83,273	12,726	160,523	3,203	200,708
0046	R13	NS	12,420	10,546	140,358	557,992	990	176,788	10,441	4,988	181,776	1,616	30,776
0054	P12	NS	24,924	21,169	193,603	239,577,381	32,007	187,652	16,427	40,390	228,042	53,041	56,986
0256	R13	NS	151,078	127,683	552,851	168,944	5,665	774,274	28,642	15,013	789,287	147,962	198,290
0271	P12	NS	22,174	18,793	111,429	1,662,263	2,924	9,089	12,264	12,915	22,004	1,218	48,004
0272	P12	NS	26,420	22,331	41,660	1,650,673	3,098	38,539	4,585	4,901	43,440	911	28,242
0273	P1	NS	7,754	6,631	128,931	12,771	789	58,307	2,735	6,372	64,679	9,530	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	211	2,840
0275	R13	NS	66,859	56,561	273,347	1,603,304	68,825	201,900	25,955	76,612	278,512	144,897	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	1,501,146	103,553	8,509	1,509,655	292,677	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	967,934	11,992	11,372	979,306	177,229	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	19,646	499,092	25,931	27,426	526,519	140,243	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	16,616	272,008	9,046	23,927	295,935	43,017	37,293
0289	P12	NS	13,056	11,126	157,114	3,439,427	515	177,710	6,872	7,353	185,063	42,914	72,152
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	59,376	7,503	43,304	662	7,427
0291	P12	NS	12,546	10,692	152,184	7,537,301	2,962	273,054	18,204	9,052	282,106	51,973	18,537
0292	P12	NS	18,468	14,603	144,857	36,590	1,394	143,379	15,943	7,666	151,045	0	27,243
0293	P123	NS	19,547	16,607	559,476	666,820	1,434	52,451	3,497	8,357	60,808	9,196	8,882
0297	P12	NS	10,023	8,586	187,850	111,645	2,876	84,578	20,675	11,009	95,587	67,004	6,039
0300	P123	NS	145,955	123,442	344,036	2,181,030	18,884	50,482	37,864	61,918	114,356	108,112	172,287
0304	P1	NS	11,498	9,776	105,161	2,083,347	1,150	72,946	1,380	5,703	78,649	27,826	18,466
0307	P123	NS	23,198	19,668	82,729	252,693	783	309,508	16,384	6,316	315,825	5,590	28,536
0308	P12	NS	20,583	17,446	105,876	39,748	7,039	44,497	6,830	11,623	56,119	45,863	22,597
0309	P1	NS	34,041	28,777	60,032	130,823	866	67,359	6,905	3,466	70,825	14,625	14,625
0310	P123	NS	8,862	7,611	215,007	2,286,147	5,246	60,202	21,642	13,760	73,962	4,300	24,124

Table 11-3. Facility-Specific Baseline Loading Estimates (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DET ID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G	TKN	Total N	Total P	TSS
0312	P12	NS	11,760	10,029	153,214	843,825	21,678	251,567	801	28,312	279,879	28,815	29,954
0314	P1	NS	11,066	9,407	98,893	234,611	1,016	22,967	6,812	5,298	28,265	7,979	17,885
0317	R13	NS	11,808	10,015	72,805	166,896	286	446,865	18,223	3,342	450,207	22,742	45,813
0318	R13	NS	26,160	20,346	505,050	1,978,192	7,267	1,345,039	47,956	13,806	1,358,846	257,086	101,005
0321	R13	NS	87,857	74,392	514,436	3,520,305	20,650	754,963	48,847	35,306	790,269	265,020	407,088
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	2,812,243	90,366	35,519	2,847,762	596,560	123,076
0325	R13	NS	79,194	67,095	550,425	1,865,354	15,047	1,203,750	52,265	15,839	1,219,588	281,350	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	254,566	9,428	429	254,994	33,999	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	465,826	10,060	11,244	477,070	52,305	29,089
0332	M123 (R123/P2)	NS	52,870	44,823	377,646	2,280,810	1,636	980,369	41,538	14,099	994,468	316,542	102,594
0333	R13	NS	411,641	347,792	655,000	1,130,793	1,909,021	51,549	62,194	1,927,681	1,979,230	317,064	895,469
0336	R13	NS	39,033	33,049	223,841	291,763	83,155	371,011	6,473	89,532	460,544	119,990	50,080
0339	P123	NS	29,698	25,347	417,857	525,666	1,645	349,246	45,989	19,738	368,983	4,843	56,289
0340	P13	NS	31,534	26,731	165,750	3,283,686	616	284,173	3,262	6,162	290,335	59,738	38,059
0342	R123	NS	15,869	13,447	115,251	135,200	829	134,878	10,943	4,112	138,990	84,440	24,143

^a NH₃-N = Ammonia (as nitrogen).

11.2 TECHNOLOGY OPTIONS LOADINGS

This section presents the methods used to develop pollutant loading estimates after implementation of the limitations and guidelines for the MPP industry. Technology option loadings are defined as the estimated pollutant loadings in MPP wastewaters after implementation of the selected technology option; they are also referred to as post-compliance or treated pollutant loadings. To estimate the technology option *loadings* for each technology option being considered, post-compliance pollutant *concentrations* were derived for each facility for which baseline pollutant loadings were estimated. Detailed descriptions of each technology option considered by EPA are presented in Section 9.

11.2.1 Establishment of Facility-Specific Post-Compliance Pollutant Concentrations

Table 11-4 presents the long-term average (LTA) concentrations for the 11 POCs for each technology option considered by EPA. LTA concentrations are expected average pollutant levels to be achieved by a facility for the selected option level. Prior to accounting for the variability of the wastewater, these target LTAs would be used to design a wastewater treatment system to meet the limitations of the final MPP rule. EPA derived these LTAs based on data from the detailed surveys and the sampling episodes. A detailed description of the methodology for LTA development is presented in Section 14.

Post-compliance concentrations for each facility were determined by comparing the facility's baseline concentration with the technology option LTA concentration. When the technology option LTA concentration was lower than the facility's baseline concentration, the technology option LTA concentration was used to represent the facility's effluent pollutant concentration after implementation of the limitations and guidelines.

Table 11-4. Technology Option Long-Term Average Concentrations (in mg/L)

Regulatory Subcategory(ies)	Technology Option	BOD ₅	CBOD ₅	COD	Fecal Coliform ^a	NH ₃ -N ^b	Nitrate+ Nitrite	O&G	TKN	Total N	Total P	TSS
A-D and F-I	1 ^b	7.0	6.0	125	400	6.11	N/A	14	8.1	N/A	N/A	25.1
	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	30.6	14	3.6	34	N/A	25.1
	2.5+P	7.0	6.0	125	400	0.895	30.6	14	3.6	34	8.3	25.1
	4	6.4	6.0	125	400	0.185	10.3	14	3.2	13.5	5.1	18.6
K and L	1 ^b	8.8	6.0	29.6	400	5.19	N/A	5.9	7.17	N/A	N/A	10.2
	2	8.8	6.0	29.6	400	1.0	N/A	5.9	4.97	N/A	N/A	10.2
	2.5	8.8	6.0	29.6	400	1.0	29.2	5.9	4.97	34	N/A	10.2
	2.5+P	8.8	6.0	29.6	400	1.0	29.2	5.9	4.97	34	4.2	10.2
	4	7.0	6.0	17.25	400	0.17	0.52	5.39	1.34	1.9	2.3	5.0
J	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	30.6	14	3.6	34	N/A	25.1
	2.5+P	7.0	6.0	125	400	0.895	30.6	14	3.6	34	8.3	25.1
	4	6.4	6.0	125	400	0.185	10.3	14	3.2	13.5	5.1	18.6

N/A = not applicable for this option level.

^a LTA concentration for Fecal Coliform is 400MPN/100ml for all options.

^b NH₃-N = Ammonia (as nitrogen).

^c Option1 was only used for estimating loadings for small facilities in Subcategories A-D, F-I ,K, and L.

11.2.2 Facility-Specific Technology Option Loading Estimates

After post-compliance pollutant concentrations were determined, technology option loadings for each facility were calculated as follows:

$$\text{Load} = (\text{concentration} \times \text{flow} \times \text{conversion factor}) / 1,000,000$$

where:

load = pollutant loadings, in pounds per year (lb/year), or million colony-forming units per year (million cfu/year).

concentration = pollutant concentration, in mg/L, or cfu/100mL.

flow = facility effluent flow rate as reported in the MPP detailed survey, in gallons per year.

conversion factor = the conversion factor used is dependent on the concentration units of the pollutant:

$$\text{mg/L} = 8.345, \text{ and}$$

$$\text{cfu/100mL} = 37.8.$$

Facility-specific technology option loading estimates for non-small slaughtering facilities are presented in Tables 11-5 to 11-7. Facility-specific technology option loading estimates for non-small further processing and independent rendering facilities are available in the Confidential Business Rulemaking Record (DCN300009). In addition, facility-specific technology option loading estimates for small facilities are available in the Confidential Business Rulemaking Record (DCN300010).

Table 11-5. Technology Option Loading Estimates for Option 2
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	135,870	62,376	4,590	N/A	27,082	19,187	N/A	N/A	46,866
0012	M123 (R123/P2)	NS	18129	15,533	525,021	3,898,704	2,870	N/A	28,025	17,827	N/A	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	N/A	14,220	848	N/A	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	N/A	26,607	22,078	N/A	N/A	49,364
0022	P123	NS	23,421	19,874	99,538	125,513	1,211	N/A	16,924	7,667	N/A	N/A	34,334
0026	P13	NS	12,594	10,795	159,762	2,273,690	5,397	N/A	21,590	16,084	N/A	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	N/A	22,688	18,933	N/A	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0032	P1	NS	5,917	5,075	79,070	48,400	2,671	N/A	13,356	8,067	N/A	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2605	N/A	14,328	11,202	N/A	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	N/A	19,052	8,087	N/A	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	2,462	N/A	3,908	16,022	N/A	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	N/A	25,195	12,726	N/A	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	N/A	10,441	4,988	N/A	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	N/A	16,427	21,042	N/A	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	N/A	28,642	15,013	N/A	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	N/A	4,585	4,528	N/A	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	N/A	2,735	6,372	N/A	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	N/A	10,586	4,164	N/A	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	N/A	25,955	14,217	N/A	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	N/A	103,553	8,509	N/A	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	N/A	11,992	11,372	N/A	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	N/A	25,931	14,204	N/A	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	N/A	9,046	13,348	N/A	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	N/A	6,872	7,353	N/A	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	N/A	14,854	7,503	N/A	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	N/A	18,204	9,052	N/A	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	N/A	15,943	7,666	N/A	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	N/A	3,497	8,357	N/A	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	N/A	20,675	11,009	N/A	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	N/A	37,864	37,391	N/A	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	N/A	1,380	5,703	N/A	N/A	18,466
0307	P123	NS	23,198	16,769	82,729	252,693	783	N/A	16,384	6,316	N/A	N/A	28,536
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	N/A	6,830	11,507	N/A	N/A	22,597
0309	P1	NS	11,553	7,877	38,859	130,823	866	N/A	6,905	3,466	N/A	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	N/A	21,642	13,760	N/A	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	N/A	801	16,652	N/A	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	N/A	6,812	5,298	N/A	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	N/A	18,223	3,342	N/A	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	N/A	47,956	13,806	N/A	N/A	101,005

Table 11-5. Technology Option Loading Estimates for Option 2 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	N/A	48,847	26,757	N/A	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	N/A	90,366	35,519	N/A	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	N/A	52,265	15,839	N/A	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	N/A	9,428	429	N/A	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	N/A	10,060	11,244	N/A	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	N/A	41,538	14,099	N/A	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	N/A	62,194	34,068	N/A	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	N/A	6,473	11,642	N/A	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	N/A	45,989	19,738	N/A	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	N/A	3,262	6,162	N/A	N/A	37,008
0342	R123		11,607	9,949	115,251	135,200	829	N/A	10,943	4,112	N/A	N/A	24,143

N/A = Not Applicable (not a pollutant of concern for this subcategory).

^a NH₃-N = Ammonia (as nitrogen).

Table 11-6. Technology Option Loading Estimates for Option 2.5
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	135,870	62,376	4,590	134,218	27,082	19,187	156,985	N/A	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	231,074	28,025	17,827	258,343	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	82,613	14,220	848	96,627	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	165,529	26,607	22,078	193,608	N/A	49,364
0022	P123	NS	23,421	19,874	99,538	125,513	1,211	98,327	16,924	7,667	115,006	N/A	34,334
0026	P13	NS	12,594	10,795	159,762	2,273,690	5,397	157,819	21,590	16,084	184,590	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	131,813	22,688	18,933	154,173	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	19,636	12,264	12,111	56,261	N/A	24,879
0032	P1	NS	5,917	5,075	79,070	48,400	2,671	57,753	13,356	8,067	65,820	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2,605	126,952	14,328	11,202	148,487	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	100,196	19,052	8,087	117,192	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	101,723	2,462	16,022	117,746	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	124,866	25,195	12,726	146,047	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	61,775	10,441	4,988	69,065	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	123,794	16,427	21,042	144,794	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	144,421	28,642	15,013	161,464	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	9,089	12,264	12,111	22,004	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	26,639	4,585	4,528	31,157	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	58,307	2,735	6,372	64,679	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	120,306	25,955	14,217	134,504	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	271,139	103,553	8,509	303,137	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	135,360	11,992	11,372	151,334	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	120,196	25,931	14,204	134,380	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	112,951	9,046	13,348	126,281	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	100,463	6,872	7,353	117,504	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	14,854	7,503	43,304	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	97,310	18,204	9,052	113,817	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	92,625	15,943	7,666	108,337	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	52,451	3,497	8,357	60,808	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	84,578	20,675	11,009	95,587	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	50,482	37,864	37,391	114,356	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	67,242	1,380	5,703	78,649	N/A	18,466
0307	P123	NS	23,198	16,769	82,729	252,693	783	81,723	16,384	6,316	95,586	N/A	28,536
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	44,497	6,830	11,507	56,119	N/A	22,597

Table 11-6. Technology Option Loading Estimates for Option 2.5
(in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0309	P1	NS	11,553	7,877	38,859	130,823	866	38,386	6,905	3,466	44,898	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	60,202	21,642	13,760	73,962	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	97,969	801	16,652	114,588	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	22,967	6,812	5,298	28,265	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	47,218	18,223	3,342	52,790	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	222,284	47,956	13,806	248,516	N/A	101,005
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	226,415	48,847	26,757	253,135	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	505,355	90,366	35,519	564,993	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	242,255	52,265	15,839	270,844	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	43,699	9,428	429	48,856	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	139,252	10,060	11,244	155,685	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	192,537	41,538	14,099	215,258	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	51,549	62,194	34,068	322,301	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	98,518	6,473	11,642	110,144	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	267,189	45,989	19,738	312,512	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	105,985	3,262	6,162	123,963	N/A	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	50,724	10,943	4,112	56,710	N/A	24,143

N/A = Not Applicable (not a pollutant of concern for this subcategory).

^a NH₃-N = Ammonia (as nitrogen).

Table 11-7. Technology Option Loading Estimates for Option 2.5+P
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	135,870	62,376	4,590	134,218	27,082	19,187	156,985	19,279	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	231,074	28,025	17,827	258,343	62,546	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	82,613	14,220	848	96,627	11,866	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	165,529	26,607	22,078	193,608	23,776	49,364
0022	P123	NS	23,421	19,874	99,538	125,513	1,211	98,327	16,924	7,667	115,006	14,124	34,334
0026	P13	NS	12,594	10,795	159,762	2,273,690	5,397	157,819	21,590	16,084	184,590	22,669	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	131,813	22,688	18,933	154,173	18,933	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	19,636	12,264	12,111	56,261	10,234	24,879
0032	P1	NS	5,917	5,075	79,070	48,400	2,671	57,753	13,356	8,067	65,820	11,219	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2,605	126,952	14,328	11,202	148,487	18,235	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	100,196	19,052	8,087	117,192	14,392	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	101,723	2,462	16,022	117,746	16,413	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	124,866	25,195	12,726	146,047	3,203	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	61,775	10,441	4,988	69,065	1,616	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	123,794	16,427	21,042	144,794	17,782	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	144,421	28,642	15,013	161,464	39,091	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	9,089	12,264	12,111	22,004	1,218	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	26,639	4,585	4,528	31,157	911	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	58,307	2,735	6,372	64,679	9,530	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	211	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	120,306	25,955	14,217	134,504	32,564	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	271,139	103,553	8,509	303,137	73,391	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	135,360	11,992	11,372	151,334	36,639	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	120,196	25,931	14,204	134,380	32,534	55,009
0287	M13(R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	112,951	9,046	13,348	126,281	30,573	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	100,463	6,872	7,353	117,504	14,430	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	14,854	7,503	43,304	662	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	97,310	18,204	9,052	113,817	13,978	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	92,625	15,943	7,666	108,337	0	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	52,451	3,497	8,357	60,808	9,196	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	84,578	20,675	11,009	95,587	17,253	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	50,482	37,864	37,391	114,356	31,598	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	67,242	1,380	5,703	78,649	9,659	18,466
0307	P123	NS	23,198	16,769	82,729	252,693	783	81,723	16,384	6,316	95,586	5,590	28,536
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	44,497	6,830	11,507	56,119	9,724	22,597
0309	P1	NS	11,553	7,877	38,859	130,823	866	38,386	6,905	3,466	44,898	5,514	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	60,202	21,642	13,760	73,962	4,300	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	97,969	801	16,652	114,588	14,072	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	22,967	6,812	5,298	28,265	7,979	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	47,218	18,223	3,342	52,790	12,781	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	222,284	47,956	13,806	248,516	60,167	101,005
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	226,415	48,847	26,757	253,135	61,285	185,780

Table 11-7. Technology Option Loading Estimates for Option 2.5+P
 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	505,355	90,366	35,519	564,993	136,788	123,076
325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	242,255	52,265	15,839	270,844	65,573	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	43,699	9,428	429	48,856	11,828	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	139,252	10,060	11,244	155,685	37,692	29,089
0332	M123(R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	192,537	41,538	14,099	215,258	52,115	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	51,549	62,194	34,068	322,301	78,031	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	98,518	6,473	11,642	110,144	26,666	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	267,189	45,989	19,738	312,512	4,843	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	105,985	3,262	6,162	123,963	15,224	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	50,724	10,943	4,112	56,710	13,730	24,143

^a NH₃-N = Ammonia (as nitrogen).

Table 11-8. Technology Option Loading Estimates for Option 4
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	79,181	62,376	780	2,387	24,741	6,151	8,538	10,420	23,181
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	1,397	78,107	28,025	17,827	102,053	38,676	59,525
0019	P13	NS	11,782	10,031	48,737	12,798	480	1,469	14,220	848	5,255	6,414	13,420
0020	P12	NS	31,248	26,550	97,653	625,681	962	2,944	26,607	7,586	10,530	12,851	28,588
0022	P123	NS	23,421	19,874	58,008	125,513	572	1,749	16,924	4,506	6,255	7,633	16,982
0026	P13	NS	12,594	10,795	93,105	2,273,690	918	2,807	21,590	7,232	10,039	12,252	27,257
0027	P12	NS	31,556	27,048	77,762	8,167,824	766	2,344	22,688	6,041	8,385	10,233	22,765
0029	P1	NS	17,057	14,620	42,034	154,526	414	1,267	12,264	3,265	4,532	5,531	12,306
0032	P1	NS	5,917	5,075	46,080	48,400	454	1,389	13,356	3,580	4,969	6,064	13,490
0039	P12	NS	23,011	19,557	74,895	1,868,315	738	2,258	14,328	5,818	8,076	9,856	21,926
0042	P12	NS	23,987	20,560	59,110	356,997	583	1,782	18,470	4,592	6,374	7,779	17,305
0044	P123	NS	26,300	22,321	67,412	3,540,310	664	2,032	2,462	5,237	7,269	8,871	19,735
0045	P12	NS	29,893	25,622	73,664	166,353	726	2,221	23,017	5,722	7,943	3,203	21,565
0046	R13	NS	12,420	10,546	140,358	557,992	374	20,881	10,441	4,988	27,283	1,616	30,776
0054	P12	NS	24,924	21,169	73,032	7,670,950	720	2,202	16,427	5,673	7,875	9,611	21,380
0256	R13	NS	30,452	28,327	552,851	168,944	873	48,817	28,642	14,966	63,783	24,172	88,050
0271	P12	NS	17,057	14,620	42,034	1,662,263	414	1,267	12,264	3,265	4,532	1,218	12,306
0272	P12	NS	6,377	5,466	15,715	1,650,673	155	474	4,585	1,221	1,695	911	4,601
0273	P1	NS	7,754	6,631	48,636	12,771	479	1,466	2,735	3,778	5,244	6,400	6,654
0274	P1	NS	7,484	6,376	33,102	189,488	326	998	10,343	2,571	3,569	211	2,840
0275	R13	NS	25,367	23,597	273,347	1,603,304	728	40,666	25,955	12,467	53,133	20,136	73,348
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	91,650	103,553	8,509	119,748	45,382	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	819	45,754	11,992	11,372	59,781	22,656	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	727	40,628	25,931	12,456	53,084	20,118	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	683	38,180	9,046	11,705	49,885	18,905	37,293
0289	P12	NS	13,056	11,126	59,268	3,439,427	515	1,787	6,872	4,604	6,391	7,799	17,351
0290	P1	NS	9,064	7,728	43,430	35,695	428	1,309	13,570	3,374	4,683	662	7,427
0291	P12	NS	12,546	10,692	57,408	6,029,841	566	1,731	17,938	4,459	6,190	7,555	16,806
0292	P12	NS	18,468	14,603	54,644	36,590	539	1,647	15,943	4,245	5,892	0	15,997
0293	P123	NS	19,547	16,607	60,318	666,820	594	1,818	3,497	4,686	6,504	7,938	8,882
0297	P12	NS	10,023	8,586	70,862	111,645	698	2,136	20,675	5,505	7,641	9,325	6,039
0300	P123	NS	52,664	45,141	129,779	2,181,030	1,279	3,912	37,864	10,081	13,994	17,078	37,993
0304	P1	NS	11,498	9,776	39,669	2,083,347	391	1,196	1,380	3,082	4,277	5,220	11,613
0307	P123	NS	19,564	16,769	48,212	252,693	475	1,453	15,065	3,745	5,199	5,590	14,114
0308	P12	NS	16,207	13,892	39,939	39,748	394	1,204	6,830	3,103	4,306	5,256	11,692
0309	P1	NS	9,190	7,877	22,646	130,823	223	683	6,905	1,759	2,442	2,980	6,630
0310	P123	NS	8,862	7,611	74,177	2,286,147	731	2,236	21,642	5,762	7,998	4,300	21,716

Table 11-8. Technology Option Loading Estimates for Option 4
(in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0312	P12	NS	11,760	10,029	57,796	843,825	570	570	1,742	4,490	6,232	7,606	16,920
0314	P1	NS	11,066	9,407	37,305	234,611	368	1,125	6,812	2,898	4,022	4,909	10,921
0317	R13	NS	9,956	9,261	72,805	166,896	286	15,961	18,223	3,342	20,854	7,903	28,788
0318	R13	NS	26,160	20,346	505,050	1,978,192	1,344	75,136	47,956	13,806	98,171	37,205	101,005
0321	R13	NS	47,740	44,410	514,436	3,520,305	1,369	76,533	48,847	23,463	99,996	37,896	138,040
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	170,819	90,366	35,519	223,189	84,584	123,076
0325	R13	NS	51,080	47,516	550,425	1,865,354	1,465	81,887	52,265	15,839	106,991	40,547	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	264	14,771	9,428	429	19,300	7,314	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	842	47,070	10,060	11,244	61,500	23,307	29,089
0332	M123(R123/P2)	NS	40,597	37,765	377,646	2,280,810	1,164	65,081	41,538	14,099	85,033	32,226	102,594
0333	R13	NS	60,785	56,544	655,000	1,130,793	1,743	51,549	62,194	29,874	127,318	48,251	175,758
0336	R13	NS	20,773	19,324	223,841	291,763	596	33,301	6,473	10,209	43,510	16,489	50,080
0339	P123	NS	29,698	25,347	157,627	525,666	1,553	4,752	45,989	12,245	16,996	4,843	46,146
0340	P13	NS	25,373	21,748	62,525	3,283,686	616	1,885	3,262	4,857	6,742	8,228	18,304
0342	R123	NS	10,695	9,949	115,251	135,200	307	17,146	10,943	4,112	22,402	8,490	24,143

^a NH₃-N = Ammonia (as nitrogen).

11.3 POLLUTANT REMOVALS

From baseline pollutant and technology option loadings, EPA estimated national pollutant removals after implementation of the limitations and guidelines. Pollutant removals were calculated by taking the difference between the baseline pollutant loadings and each technology option loadings. National pollutant removal estimates for non-small facilities for each technology option are presented in Table 11-9.

Table 11-9. Removal of Specified Pollutants by Subcategory and Option¹-Non-small Facilities

Subcategory	Pollutant	Removals (Pounds per Year)			
		Option 2	Option 2.5	Opt. 2.5+P	Option 4
A through D (non-small)	5-Day Biochemical Oxygen Demand	609,665	609,665	609,665	640,054
	Total Suspended Solids	967,092	967,092	967,092	1,116,025
	Chemical Oxygen Demand	0	0	0	0
	Carbonaceous Biochemical Oxygen Demand	511,342	511,342	511,342	511,342
	Ammonia (as Nitrogen)	2,250,306	2,250,306	2,250,306	2,309,928
	Total Nitrogen	0	15,400,791	15,400,791	18,456,984
	Total Phosphorus	0	0	4,519,867	4,972,188
	Nitrate/Nitrite	0	13,574,558	13,574,558	16,374,921
	Total Kjeldahl Nitrogen	2,212,522	2,212,522	2,212,522	2,228,721
	Oil&Grease	0	0	0	0
F through I (non-small)	5-Day Biochemical Oxygen Demand	21,703	21,703	21,703	24,467
	Total Suspended Solids	0	0	0	0
	Chemical Oxygen Demand	42,213	42,213	42,213	42,213
	Carbonaceous Biochemical. Oxygen Demand	18,395	18,395	18,395	18,395
	Ammonia (as Nitrogen)	10,575	10,575	10,575	13,804
	Total Nitrogen	0	0	0	79,677
	Total Phosphorus	0	0	0	0
	Nitrate/Nitrite	0	0	0	0
	Total Kjeldahl Nitrogen	12,945	12,945	12,945	15,677
	Oil&Grease	0	0	0	0
J (non-small)	5-Day Biochemical Oxygen Demand	34,176	34,176	34,176	36,734
	Total Suspended Solids	0	0	0	19,871
	Chemical Oxygen Demand	0	0	0	0
	Carbonaceous Biochemical. Oxygen Demand	28,570	28,570	28,570	28,570
	Ammonia (as Nitrogen)	48,965	48,965	48,965	56,388
	Total Nitrogen	0	1,469,407	1,469,407	1,652,506
	Total Phosphorus	0	0	590,434	622,583
	Nitrate/Nitrite	0	1,465,011	1,465,011	1,644,216
	Total Kjeldahl Nitrogen	51,819	51,819	51,819	54,788
	Oil & Grease	0	0	0	0
K (non-small)	5-Day Biochemical Oxygen Demand	643,830	643,830	643,830	868,841
	Total Suspended Solids	1,309,553	1,309,553	1,309,553	2,573,666
	Chemical Oxygen Demand	6,513,778	6,513,778	6,513,778	11,244,275
	Carbonaceous Biochemical Oxygen Demand	725,207	725,207	725,207	725,207
	Ammonia (as Nitrogen)	331,973	331,973	331,973	502,103
	Total Nitrogen	0	9,367,808	9,367,808	20,883,771
	Total Phosphorus	0	0	4,147,385	4,671,571
	Nitrate/Nitrite ²	0	10,112,961	10,112,961	20,103,140

Table 11-9. Removal of Specified Pollutants by Subcategory and Option¹-Non-small Facilities (Continued)

Subcategory	Pollutant	Removals (Pounds per Year)			
		Option 2	Option 2.5	Opt. 2.5+P	Option 4
	Total Kjeldahl Nitrogen	223,255	223,255	223,255	800,944
	Oil & Grease	313,477	313,477	313,477	329,373
L (non-small)	5-Day Biochemical Oxygen Demand	9,143	9,143	9,143	18,672
	Total Suspended Solids	135	135	135	3,923
	Chemical Oxygen Demand	43,609	43,609	43,609	59,123
	Carbonaceous Biochemical. Oxygen Demand	13,889	13,889	13,889	13,889
	Ammonia (as Nitrogen)	9,492	9,492	9,492	16,123
	Total Nitrogen	0	146,364	146,364	354,355
	Total Phosphorus	0	0	25,012	27,000
	Nitrate/Nitrite ²	0	153,476	153,476	335,921
	Total Kjeldahl Nitrogen	5,685	5,685	5,685	19,039
	Oil & Grease	0	0	0	0

¹ Incremental to baseline of current performance. Current performance based on summarized 1999 DMR data provided in response to detailed surveys. Pollutant loading for various treatment options based on sampling data, survey information, and DMR data.

² EPA recognizes that total nitrogen should be more than nitrate/nitrite as nitrogen because total nitrogen is the sum of nitrate/nitrite as nitrogen and total Kjeldahl nitrogen. However, the target effluent concentrations were taken from different sets of facilities (i.e., those that provided total nitrogen data and those that provided nitrate/nitrite as nitrogen data). EPA is regulating total nitrogen, not nitrate/nitrite nitrogen for the final rule.

11.4 SUPPLEMENTAL ANALYSES

As described previously in Section 10.8, EPA performed four sensitivity cost runs to determine the impacts of various issues on final rule decisions. In order to evaluate the cost-effectiveness of cost runs 3 and 4, EPA developed parallel loadings estimates using the higher target effluent nitrogen concentrations and updated facility data.

As a result of incorporating updated facility data for the this analysis, default concentrations for developing baseline pollutant concentrations were slightly modified to incorporate the non-1999 data added for the analyses, as well as any updated data and information collected subsequent to the NODA. Table 11-10 summarizes the default concentrations used for developing baseline pollutant concentrations for the supplemental analyses.

Table 11-11 presents the facility-specific baseline loading estimates for the sensitivity runs. In addition, Table 11-12 summarizes technology option LTAs, and Tables 11-13 and 11-14

present the facility-specific technology option loading estimates (for Option 2 and Option 2.5, respectively) for the sensitivity runs 3 and 4.

Table 11-10. Default Concentrations for Facility Baseline Concentration Development (in mg/L)

Regulatory Subcategory	BOD ₅	COD	Fecal Coliform	Ammonia (as nitrogen)	Oil and Grease	TSS
A-D	11.6	70	114	2.72	6.6	23
K	7.3	46	536	1.43	5.0	11
F-I and L	12.6	77	194	3.12	5.0	17
J	7.5	111	124	5.82	0.3	16

Table 11-11. Facility-Specific Baseline Loading Estimates for Sensitivity Runs 3 and 4
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DESID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0011	P12	NS	12,885	11,017	209,904	62,376	10,098	218,586	27,541	19,187	237,773	82,664	59,673
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	665,980	28,025	17,827	683,807	398,031	59,525
0019	P13	NS	11,782	10,031	129,199	12,798	1,384	256,259	14,220	848	257,107	11,866	13,420
0020	P12	NS	31,248	26,550	258,872	625,681	10,869	270,647	26,607	22,078	292,725	87,489	49,364
0022	P123	NS	21,382	21,382	55,832	50,221	415	1,666	21,052	5,900	7,566	16,080	17,819
0026	P123	NS	12,594	10,795	246,814	2,273,690	5,397	273,215	21,590	16,084	289,300	229,161	75,563
0027	P12	NS	58,694	49,685	206,143	11,379,208	10,008	348,187	22,688	33,945	382,132	70,863	51,782
0029	P1	NS	48,982	41,425	111,429	154,526	31,799	19,636	12,264	36,624	56,261	19,494	46,298
0032	P12	NS	5,917	5,075	122,154	48,400	2,778	57,753	13,356	8,067	65,820	64,317	16,562
0039	P12	NS	23,011	19,557	198,540	1,868,315	2,6053	51,475	14,328	11,2023	62,676	37,373	26,050
0042	P12	NS	26,797	22,725	156,697	356,997	1,302	273,031	19,052	8,087	281,118	59,907	28,578
0044	P123	NS	26,300	22,321	178,704	3,540,310	8,285	101,723	2,462	16,022	117,746	129,899	42,596
0045	P12	NS	86,262	72,951	195,279	166,353	4,270	145,657	83,273	12,726	158,383	3,203	200,708
0046	R13	NS	12,420	10,546	140,358	557,992	990	176,788	10,441	4,988	181,776	1,616	30,776
0054	P12	NS	24,924	21,169	193,603	239,577,381	32,007	187,652	16,427	40,390	228,042	53,041	56,986
0256	R13	NS	151,078	127,683	552,851	168,944	5,665	774,274	28,642	15,013	789,287	147,962	198,290
0271	P12	NS	22,174	18,793	111,429	1,662,263	2,924	9,089	12,264	12,915	22,004	1,218	48,004
0272	P12	NS	26,420	22,331	41,660	1,650,673	3,098	39,375	4,585	4,901	44,276	911	28,242
0273	P1	NS	7,754	6,631	128,931	12,771	789	58,307	2,735	6,372	64,679	9,530	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	211	2,840
0275	R13	NS	66,859	56,561	273,347	1,603,304	68,825	216,559	25,955	76,612	293,171	142,013	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	1,501,146	103,553	8,509	1,509,655	292,677	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	967,934	11,992	11,372	979,306	177,229	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	19,646	499,092	25,931	27,426	526,519	140,243	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	16,616	272,008	9,046	23,927	295,935	43,017	37,293
0289	P12	NS	13,056	11,126	157,114	3,439,427	515	177,710	6,872	7,353	185,063	42,914	72,152
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	59,376	7,503	43,304	662	7,427
0291	P12	NS	12,546	10,692	152,184	7,537,301	2,962	273,054	18,204	9,052	282,106	51,973	18,537
0292	P12	NS	18,468	14,603	144,857	36,590	1,394	143,379	15,943	7,666	151,045	0	27,243
0293	P123	NS	19,547	16,607	559,476	666,820	1,434	52,451	3,497	8,357	60,808	9,196	8,882
0297	P12	NS	10,023	8,586	187,850	111,645	2,876	83,303	20,675	11,009	94,312	66,040	6,039
0300	P123	NS	145,955	123,442	344,036	2,181,030	18,884	50,482	37,864	61,918	114,356	108,112	172,287
0304	P1	NS	11,498	9,776	105,161	2,083,347	1,150	72,946	1,380	5,703	78,649	27,826	18,466
0307	P123	NS	22,506	19,128	126,223	33,803	879	191,242	24,998	2,718	193,960	8,529	25,386
0308	P12	NS	20,583	17,446	105,876	39,748	7,039	43,748	6,830	11,623	55,371	45,863	22,597
0309	P1	NS	9,465	8,030	60,032	130,823	866	67,359	6,905	3,466	70,825	14,625	14,625
0310	P12	NS	8,862	76,112	150,722	86,147	5,246	60,202	21,642	13,760	73,962	4,300	24,124

Table 11-11. Facility-Specific Baseline Loading Estimates for Sensitivity Runs 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0312	P12	NS	11,760	10,029	153,214	843,825	21,678	251,567	801	28,312	279,879	28,815	29,954
0314	P1	NS	11,066	9,407	98,893	234,611	1,016	22,967	6,812	5,298	28,265	7,979	17,885
0317	R13	NS	11,808	10,015	72,805	166,896	286	446,865	18,223	3,342	450,207	22,742	45,813
0318	R13	NS	26,160	20,346	505,050	1,978,192	7,267	1,345,039	47,956	13,806	1,358,846	257,086	101,005
0321	R13	NS	87,857	74,392	514,436	3,520,305	20,650	754,963	48,847	35,306	790,269	265,415	407,088
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	2,812,243	90,366	35,519	2,847,762	596,560	123,076
0325	R13	NS	79,194	67,095	550,425	1,865,354	15,047	1,203,750	52,265	15,839	1,219,588	288,115	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	254,566	9,428	429	254,994	33,999	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	465,826	10,060	11,244	477,070	52,305	29,089
0332	M123(R123/P2)	NS	52,870	44,823	377,646	2,280,810	1,636	980,369	41,538	14,099	994,468	316,542	102,594
0333	R13	NS	411,641	347,792	655,000	1,130,793	1,909,021	51,549	62,194	1,927,681	1,979,230	360,430	895,469
0336	R13	NS	39,033	33,049	223,841	291,763	83,155	371,011	6,473	89,532	460,544	119,990	50,080
0339	P123	NS	29,698	25,347	417,857	525,666	1,645	349,246	45,989	19,738	368,983	4,843	56,289
0340	P13	NS	31,534	26,731	165,750	3,283,686	616	284,173	3,262	6,162	290,335	59,111	38,059
0342	R123	NS	15,869	13,447	115,251	135,200	829	134,878	10,943	4,112	138,990	84,440	24,143

^a NH₃-N = Ammonia (as nitrogen).

Table 11-12. Technology Option Long-Term Average Concentrations for Sensitivity Runs 3 and 4 (in mg/L)

Regulatory Subcategory(ies)	Technology Option	BOD ₅	CBOD ₅	COD	Fecal Coliform ^a	NH ₃ -N ^b	Nitrate + Nitrite	Oil and Grease	TKN	Total Nitrogen	Total Phosphorus	TSS
A-D and F-I	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	41.7	14	3.6	45.4	N/A	25.1
K and L	2	8.8	6.0	29.6	400	1.0	N/A	5.9	4.97	N/A	N/A	10.2
	2.5	8.8	6.0	29.6	400	1.0	40.4	5.9	4.97	45.4	N/A	10.2
J	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	41.7	14	3.6	45.4	N/A	25.1

N/A = not applicable for this option level.

^a LTA concentration for Fecal Coliform is 400MPN/100 ml for all options.

^b NH₃-N = Ammonia (as nitrogen).

Table 11-13. Technology Option Loading Estimates for Option 2 for Sensitivity Runs 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate+Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P12	NS	12,885	11,017	135,870	62,376	4,590	N/A	27,082	19,187	N/A	N/A	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	N/A	28,025	17,827	N/A	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	N/A	14,220	848	N/A	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	N/A	26,607	22,078	N/A	N/A	49,364
0022	P123	NS	21,382	21,382	55,832	50,221	415	N/A	21,052	5,900	N/A	N/A	17,819
0026	P123	NS	12,594	10,795	159,762	2,273,690	5,397	N/A	21,590	16,084	N/A	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	N/A	22,688	22,405	N/A	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0032	P12	NS	5,917	5,075	79,070	48,400	2,671	N/A	13,356	8,067	N/A	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2,605	N/A	14,328	11,202	N/A	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	N/A	19,052	8,087	N/A	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	N/A	2,462	16,022	N/A	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	N/A	25,195	12,726	N/A	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	N/A	10,441	4,988	N/A	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	N/A	16,427	21,042	N/A	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	N/A	28,642	15,013	N/A	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	N/A	4,585	4,528	N/A	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	N/A	2,735	6,372	N/A	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	N/A	10,586	4,164	N/A	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	N/A	25,955	14,217	N/A	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	N/A	103,553	8,509	N/A	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	N/A	11,992	11,372	N/A	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	N/A	25,931	14,204	N/A	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	N/A	9,046	13,348	N/A	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	N/A	6,872	7,353	N/A	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	N/A	14,854	7,503	N/A	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	N/A	18,204	9,052	N/A	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	N/A	15,943	7,666	N/A	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	N/A	3,497	8,357	N/A	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	N/A	20,675	11,009	N/A	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	N/A	37,864	37,391	N/A	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	N/A	1,380	5,703	N/A	N/A	18,466
0307	P123	NS	22,506	19,128	126,223	33,803	879	N/A	24,998	2,718	N/A	N/A	25,386
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	N/A	6,830	11,507	N/A	N/A	22,597
0309	P1	NS	9,465	7,877	38,859	130,823	866	N/A	6,905	53,466	N/A	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	N/A	21,642	13,760	N/A	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	N/A	801	16,652	N/A	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	N/A	6,812	5,298	N/A	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	N/A	18,223	3,342	N/A	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	N/A	47,956	13,806	N/A	N/A	101,005

Table 11-13. Technology Option Loading Estimates for Option 2 for Sensitivity Runs 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate+Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	N/A	48,847	26,757	N/A	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	N/A	90,366	35,519	N/A	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	N/A	52,265	15,839	N/A	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	N/A	9,428	429	N/A	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	N/A	10,060	11,244	N/A	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	N/A	41,538	14,099	N/A	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	N/A	62,194	34,068	N/A	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	N/A	6,473	11,642	N/A	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	N/A	45,989	19,738	N/A	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	N/A	3,262	6,162	N/A	N/A	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	N/A	10,943	4,112	N/A	N/A	24,143

^a NH₃-N = Ammonia (as nitrogen).

Table 11-14. Technology Option Loading Estimates for Option 2.5 for Supplemental Analyses 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P12	NS	12,885	11,017	135,870	62,376	4,590	185,399	27,082	19,187	208,166	N/A	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	315,300	28,025	17,827	342,569	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	114,116	14,220	848	128,130	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	228,650	26,607	22,078	256,729	N/A	49,364
0022	P123	NS	21,382	21,382	55,832	50,221	415	1,666	21,052	5,900	7,566	N/A	17,819
0026	P123	NS	12,594	10,795	159,762	2,273,690	5,397	218,000	21,590	16,084	244,771	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	182,077	22,688	22,405	204,436	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	19,636	12,264	12,111	56,261	N/A	24,879
0032	P12	NS	5,917	5,075	79,070	48,400	2,671	57,753	13,356	8,067	65,820	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868	2,605	175,362	14,328	11,202	196,897	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	138,403	19,052	8,087	155,399	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	101,723	2,462	16,022	117,746	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	145,657	25,195	12,726	158,383	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	84,292	10,441	4,988	91,582	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	171,001	16,427	21,042	192,000	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	197,062	28,642	15,013	214,106	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	9,089	12,264	12,111	22,004	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	36,797	4,585	4,528	41,315	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	58,307	2,735	6,372	64,679	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	164,157	25,955	14,217	178,355	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	369,968	103,553	8,509	401,966	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	184,698	11,992	11,372	200,672	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	164,007	25,931	14,204	178,191	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	154,122	9,046	13,348	167,451	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	138,772	6,872	7,353	155,814	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	14,854	7,503	43,304	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	134,417	18,204	9,052	150,924	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	127,946	15,943	7,666	143,658	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	52,451	3,497	8,357	60,808	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	83,303	20,675	11,009	94,312	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	50,482	37,864	37,391	114,356	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	72,946	1,380	5,703	78,649	N/A	18,466
0307	P123	NS	22,506	19,128	126,223	33,803	879	172,235	24,998	2,718	193,386	N/A	25,386
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	43,748	6,830	11,507	55,371	N/A	22,597
0309	P1NS	NS	9,462	7,877	38,859	130,823	866	53,024	6,905	3,466	59,535	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	60,202	21,642	13,760	73,962	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	135,327	801	16,652	151,946	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	22,967	6,812	5,298	28,265	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	64,429	18,223	3,342	70,001	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	303,306	47,956	13,806	329,538	N/A	101,005

Table 11-14. Technology Option Loading Estimates for Option 2.5 for Supplemental Analyses 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DEIID	Category	Size	BOD ₅	CBOD ₅	COD	Fecal Coliform	NH ₃ -N ^a	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	308,943	48,847	26,757	335,662	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	689,556	90,366	35,519	749,194	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	330,556	52,265	15,839	359,145	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	59,627	9,428	429	64,784	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	190,009	10,060	11,244	206,442	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	262,716	41,538	14,099	285,437	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	51,549	62,194	34,068	427,379	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	134,427	6,473	11,642	146,054	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	349,246	45,989	19,738	368,983	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	146,400	3,262	6,162	164,378	N/A	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	69,213	10,943	4,112	75,199	N/A	24,143

^a NH₃-N = Ammonia (as nitrogen).